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Journal of Mycology

VOLUME 13 — JANUARY 1907

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NORTH AMERICAN SPECIES OF LEPIOTA.

BY A. P. MORGAN.

(*Concluded from page 203.*)

VIII. HIATULOIDES. *Pileus submembranaceous, thin, soft and flexible, umbonate; the flesh well nigh obsolete except beneath the central disc; the dermis radiately fibrillose and plicate-sulcate often to the umbo; the cuticle separating into scales. Stipe slender and sometimes much elongated, fistulous and fragile, subglabrous; the annulus thin and membranaceous.*

A tribe of many species taking its name from Lepiota hiatuloides Speg. Like the genus Hiatula to which it is related, its members abound in tropical regions; in colder climates some of them appear in greenhouses, on hot beds and in similar situations.

a. Pileus white with pallid or brownish scales.

60. LEPIOTA FARINOSA PECK, 43 N. Y. REP. 1889.

Pileus submembranaceous, oblong-ovoid then campanulate and expanded, umbonate, the dermis white beneath the cuticle, flocculose-farinaceous, plicate-sulcate around the margin; the cuticle thin, whitish or pale alutaceous, at first continuous, very soon separating into small scales except upon the umbo, which at length are widely scattered and deciduous. Stipe tapering upward from a clavate base, more or less elongated and flexuous, hollow, white, subglabrous; the annulus a thin membrane, subpersistent. Lamellae rather narrow, close, free, white; spores elliptic-ovoid, sometimes oblique, 8-10 x 5-7 mic. uniguttulate.

Caespitose; growing on old manure heaps, in the rich soil of gardens, etc. Boston, Mass., *Forster;* Preston, O. Common and abundant. Pileus 5-8 cm. in diameter; the stipe 6-10 cm. in height, 3-5 mm. thick at the apex and 7-12 mm. thick below. Probably confused generally with Lepiota cretacea from which it seems to differ chiefly in the pale color of the cuticle.

61. LEPIOTA MASTOIDEA. AGARICUS MASTOIDEUS FRIES, SYST. MYC. I. 1821, BASED ON A FIGURE AND DESCRIPTION OF BATTARRA, FUNGI ARIM. 1755; A. (LEPIOTA) SUBREMOTUS B. & C., ANN. AND MAG. N. H. 1859.

Pileus submembranaceous, at first elliptic-ovoid then campanulate and explanate, abruptly umbonate; the dermis radiately fibrillose, plicate-sulcate around the margin, beneath the cuticle snow-white; the cuticle whitish or drab, gradually separating into minute scales and warts, except upon the umbo. Stipe tapering upward from a bulbous base, slender, fistulous, whitish, subglabrous, the annulus thin, membranaceous. Lamellae rather narrow, close, white, free and remote from the stipe; spores elliptic-ovoid, 7-9 x 5-6 mic., uniguttulate.

Subcaespitose; growing in rich soil about old stumps in woods. New England, *Sprague*: Miami Valley, O., *Lea, Morgan.* Pileus 6-8 cm. in diameter; the stipe 7-10 cm. in length, 3-4 mm. thick at the apex and 5-8 mm. thick at the base. Mr. Lea's specimens were found at Waynesville; my figures were made in Dayton (1878); I have specimens collected about Preston; so the plant is an undoubted native to this region. A. (Amanita) umbonatus Schumacher, En. Pl. Saellandiae, the pileus furnished with brownish scales, is described by Berkeley and figured by Cooke under the name Agaricus mastoideus. Lepiota subremota "entirely yellow or white," Bull. Cornell University, Vol. III. No. 1, should have had another name and been described.

62. LEPIOTA RUGULOSA PECK, BULL. TORR. CLUB, 1900.

Pileus submembranaceous, broadly convex or nearly plane, umbonate; the dermis radiately fibrillose, plicate-rugulose, all white, the cuticle at length breaking up into minute fibrous scales. Stipe slender, nearly equal, fistulous, rufescent beneath the white silky-fibrillose cuticle; the annulus membranaceous, subpersistent, white. Lamellae narrow, close, free, white; spores elliptic-oblong, 6-8 x 4-5 mic.

Growing on the ground in woods. Washington, D. C., *Mrs. Williams;* Preston, O. Pileus 1-2 cm. in diameter, the stipe 2-3 cm. long and 2-3 mm. thick. I find this among undetermined specimens of 1896; it makes beautiful specimens; my notes do not add much to Prof. Peck's description.

63. LEPIOTA CRETACEA, AGARICUS CRETACEUS BULLIARD, HERB. FR. PL. 374, 1787, AGARICUS CEPAESTIPES (IN PART) SOWERBY, ENG. FUNGI, 1797; COOKE, ILLUSTR. PL. 942; PECK, N. Y. REP. 1882 AND 1904; LEPIOTA MAMMAEFORMIS UNDERWOOD, BULL. TORR. CLUB, 1897.

Pileus submembranaceous, at first subovoid with an obtuse apex, then campanulate and expanded, umbonate; the dermis white beneath the cuticle, densely flocculose-scaly and farinaceous, plicate-sulcate around the margin; the cuticle thin, brownish, darker on the umbo, very soon separating into minute scales which are more or less deciduous. Stipe arising from a more or less elongated and thickened base, tapering upward, flexuous, hollow, white, subglabrous; the annulus thin, membranaceous, subpersistent. Lamellae rather narrow, close, free, white; spores elliptic-ovoid, 8-10 x 5-7 mic.

Caespitose; growing in the rich soil of gardens, hot beds, etc. Probably common in such situations throughout the country. Pileus 5-10 cm. in diameter; the stipe 8-16 cm. in height, 4-6 mm. thick at the apex and 1-2 cm. thick at the base.

64. LEPIOTA NICTOPHILA ELLIS, BULL. TORR. CLUB, 1874; SYLLOGE V. 50.

Pileus fleshy, cylindraceous-hemispheric then convex or concave, broadly umbonate; the margin sulcate-striate, the striae at length reaching nearly to the center; the cuticle at first continuous, black, soon breaking up into small scales which are scattered over the surface. Stipe slender, fistulous, fibrous-stuffed, farinaceous-scaly, ornamented above the middle with an annular band, marked around the base by a black line. Lamellae rather close, whitish, rounded behind and free; spores oblong, about 5 mic. in length.

Subcaespitose and furnished with an abundant white mycelium. Newfield, N. J., *Ellis.* Pileus 2-3 cm. in diameter, the stipe 2-3 cm. in height.

65. LEPIOTA LONGISTRIATA PECK, BULL. TORR. CLUB, 1898.

Pileus submembranaceous, convex or nearly plane, umbonate; the dermis radiately fibrillose, striate nearly or quite to the umbo; the cuticle grayish or brownish, broken up into small fibrous scales. Stipe tapering upward from a thickened base, slender, fistulous; the annulus delicate, evanescent. Lamellae narrow, close, free, whitish or yellowish; spores elliptic, 6-8 x 4-5 mic.

Growing in rich soil in gardens. Alabama, *Earle.* Pileus 3-5 cm. in diameter, the stipe 5-8 cm. long and 2-6 mm. thick.

66. LEPIOTA EARLEI PECK, BULL. TORR. CLUB, 1898.

Pileus submembranaceous, broadly convex or nearly plane, umbonate; the dermis radiately fibrillose, white beneath the cuticle, the margin striate and somewhat lacerate; the cuticle at first brown and continuous, at length separating into minute scales except upon the umbo. Stipe tapering upward from a thickened base, slender, hollow, fibrillose, reddening where bruised. Lamellae close subventricose, free, white; spores elliptic, 10-12 x 6-8 mic.

Caespitose; growing in newly cleared land. Alabama, *Earle*. Pileus 5-7 cm. in diameter, the stipe 5-7 cm. long and 4-6 mm. thick. "A very pretty and delicate species." It is smaller than Lepiota Americana and has larger spores; the change in color is limited to wounded places.

b. Pileus white with yellow or all yellow.

67. LEPIOTA LUTEA, AGARICUS LUTEUS BOLTON, HIST. FUNG. 1788; WITHERING, BRIT. PL. IV, 233; COOKE, ILLUSTR. PL. 5.

Pileus submembranaceous, at first subovoid then campanulate and explanate, subumbonate; the dermis radiately fibrillose, plicate-sulcate around the margin, yellow, the cuticle separating into small scales scattered upon the surface. Stipe elongated, slender above the more or less elongated and inflated base, fistulous, yellow, subglabrous; the annulus thin membranaceous. Lamellae rather broad, subdistant, yellow, free; spores elliptic, 7-8 x 4-5 mic.

Growing in green houses, Columbus, O., *Kellerman*. Pileus 3-6 cm. in diameter; the stipe 6-10 cm. in length, 3-5 mm. thick at the apex and 6-10 mm. thick at the base. The specimens I have seen are pure yellow throughout; it is probably not uncommon in green houses everywhere.

68. LEPIOTA SPECTABILIS CLEMENT, BOT. NEB. III, 1894.

Pileus submembranaceous, convex and explanate with a smooth depressed disc, the dermis radiately fibrillose, pale sulphur-colored, the surface pulverulent, striate or sulcate around the margin. Stipe tapering upward from a strongly thickened base, minutely scaly above the annulus, below it glabrous, colored as the pileus; the annulus straw-colored persistent. Lamellae narrow, close, yellowish, remote from the stipe; spores ovoid, 5-6 mic. in diameter, uniguttulate.

Growing in a green house, Lincoln, Neb., *Clements*. Pileus 2-2.5 cm. in diameter; the stipe 3-4 cm. long, 3 mm. thick above and 7-8 mm. below.

69. LEPIOTA FRAGILISSIMA, HIATULA FRAGILISSIMA RAVENEL, IN BERKLEY'S CENTURIES OF N. A. FUNGI, ANN. & MAG. N. H. 1853.

Pileus membranaceous, very thin and fragile, ovoid then campanulate and explanate, subumbonate; the dermis radiately fibrillose, white beneath a yellow pulverulence, plicate-sulcate and rimulose. Stipe arising from a somewhat bulbous base, slender, elongated, fistulous, fibrous-stuffed, very fragile, yellow, with a white mycelium at the base; the annulus movable. Lamellae white, thin and membranaceous, rather distant, obtuse behind and remote from the stipe; spores obliquely elliptic, rather large.

Solitary or gregarious; growing on earth and decayed vegetables on the margin of swamps. S. Carolina, *Ravenel*. Pileus 5-8 cm. in diameter, the stipe 10-15 cm. in height.

70. LEPIOTA SULPHURINA, MASTOCEPHALUS SULPHURINUS CLEMENTS, BOT. NEB. IV, 1896.

Pileus submembranaceous, campanulate then convex, umbonate; the dermis radiately fibrillose, sulphur-yellow, torn into crowded, oblong or elongate scales, plicate-sulcate around the margin; the umbo glabrous, incarnate-brick-colored. Stipe arising from a bulbous base, tapering upward, fistulous, pruinose, at the base yellow-floccose, isabelline above; the annulus membranaceous, sulphur-yellow, lacerate. Lamellae linear, crowded, adnexed, white or pale straw-colored; spores elliptic-ovoid, 7-9 x 4-5 mic. uniguttulate.

Growing on the ground. Nebraska, *Clements*. Pileus 1.5-3 cm. in diameter; the stipe 4 cm. long, 3-4 mm. thick above, 6-7 mm. below.

71. LEPIOTA FLAVESCENS MORGAN SP. NOV.

Pileus submembranaceous, ovoid then campanulate and explanate, subumbonate; the dermis radiately fibrillose, becoming scaly, sulcate nearly to the center; pale yellow, fulvescent on the umbo. Stipe tapering upward, slender, fistulous, rufescent beneath the white-fibrillose cuticle; the annulus thin, membranaceous, yellowish, persistent. Lamellae narrow, subdistant, free, white or yellowish; spores elliptic-oblong, obliquely apiculate 5-6 x 3-4 mic. uniguttulate.

Growing on the ground under Robinia and Gleditsia trees. Preston, O. Pileus 2-4 cm. in diameter, the stipe 3-5 cm. long and 2-4 mm. thick. Apparently related to such species as Lepiota sulphurella K. & C. and L. citrinella Speg.

72. LEPIOTA RHODOPEPLA MORGAN SP. NOV.

Pileus submembranaceous, ovoid then campanulate and explanate, subumbonate; the dermis radiately fibrillose, rimulose-sulcate nearly to the center, beneath the cuticle whitish changing to rose-color; cuticle very thin, pale-yellow, soon separating into furfuraceous scales. Stipe tapering upward, fistulous, rose-colored beneath the white-fibrillose cuticle; the annulus thin, membranaceous, pale yellow. Lamellae rather broad, subdistant, whitish changing to pinkish, spores elliptic-oblong, 6-8 x 4-5 mic.

Growing on the ground among weeds in cultivated fields. Preston, O. Pileus 1-2 cm. in diameter, the stipe 2-3 cm. long and 1-2 mm. thick.

IX. PROCERAE. *Pileus thick and fleshy, usually umbonate; the dermis floccose or fibrillose beneath the cuticle; the cuticle at first smooth and continuous, at length commonly separating into large irregular scales which are more or less deciduous. Stipe tapering upward from a thickened or bulbous base; the annulus often thick subcoriaceous, and truly movable.*

Lepiotae of the largest size, comprising numerous species; in many of these is to be found the typical "annulus mobilis."

a. Lepiotae of the largest size; the annulus thick and easily movable.

73. LEPIOTA PORRIGENS, AGARICUS PORRIGENS VIVIANI, FUNG. IT. 1834; AGARICUS PROMINENS FRIES, HYM. EUR. 1874.

Pileus fleshy, ovoid then campanulate and expanded, umbonate; the flesh thick, soft, white, deeply impressed around the apex of the stipe; the dermis white-fibrillose beneath the cuticle; the cuticle thin, drab or pale alutaceous, at length breaking up into irregular scales (except upon the umbo) which are more or less deciduous. Stipe very tall, tapering upward from a bulbous base, fistulous, fibrous-stuffed, minutely scaly or nearly glabrous, whitish or pale drab; the annulus mobile, raised to the summit of the stipe. Lamellae broad, close, white becoming pinkish, tapering inward, remote from the apex of the stipe; spores elliptic-oblong, obliquely apiculate, 12-16 x 9-10 mic.

Solitary; growing in rich soil along the borders of woodlands. Vermont, *Morgan;* New York, *Peck;* Wisconsin, *Brown;* Preston, O. Pileus 10-18 cm. in diameter; the stipe 20-30 cm. in height, the bulbous base 3-4 cm. thick, narowing upward from about 2 cm. below to 9-12 mm. at the apex. The snow-white fully expanded pileus of this plant is strikingly different in appearance from that of the common Lepiota procera.

74. LEPIOTA PROCERA, AGARICUS PROCERUS SCOPOLI, FLORA CARN. 1772; AMANITA PETIOLO PROCERO, ANNULATO, IN ACETABULUM PILEI IMMISSO, ETC., HALLER, HIST. STIRP. HELVETIAE, 1768.

Pileus fleshy, ovoid then campanulate and expanded, umbonate; the flesh thick, soft, white, deeply impressed around the apex of the stipe; the dermis beneath the cuticle radiately fibrillose and rufescent; the cuticle thick, at first smooth and continuous, rufous to umber in color, at length torn asunder, except upon the umbo, into large irregular scales which become scattered and gradually fall away. Stipe tall, tapering upward from a bulbous base, fistulous, fibrous-stuffed; the cuticle thin, flocculose, rufous or brownish, at length drawn apart into minute scales; the annulus thick, soft, subcoriaceous, mobile, raised high upon the stipe. Lamellae broad, close, white or pinkish, tapering slightly inward, free and remote from the apex of the stipe; spores elliptic or obovoid, apiculate, 14-18 x 9-11 mic. with one or more oily guttulae.

Solitary or gregarious, growing in meadows, pastures and open woods. Recorded from all parts of N. America. Pileus 8-16 cm. in diameter; the stipe 15-25 cm. in height, the bulbous base 2-3 cm. in thickness, tapering upward from 12-16 mm. below to 8-12 mm. at the apex. A splendid Agaric, known from the earliest times and found in all the countries of the earth.

75. LEPIOTA RHACODIOIDES P. HENNINGS, IN ENGL. BOT. JAHRB. 1901; SYLLOGE XVII, 3.

Pileus fleshy, campanulate-explanate, obtusely umbonate, covered as far as the middle with scattered, broad, brown, membranaceous scales, around the margin even, glabrous, whitish. Stipe very tall arising from a bulbous base, cylindric, even, glabrous, whitish or brownish; the annulus thick, mobile. Lamellae free, close, lanceolate, whitish; spores elliptic, 12-17 x 8-10 mic. uniguttulate.

Growing among old leaves. Pileus 15-20 cm. in diameter; the stipe 20-30 cm. in height, the bulbous base 3-4 cm. in thickness, tapering upward to 2-3 cm. The pileus lacks the umbo of L. procera and appears to be covered all over with the brown shaggy scales, which at length are deciduous around the margin and quite to the middle. This or a similar plant is reported from western New York by Prof. Peck in the 48 N. Y. Report; it is probably to be met with elsewhere. It differs from Lepiota rhacodes in having the spores of L. procera.

76. LEPIOTA RHACODES VITTADINI, FUNG. MANG. 1835; STEVENSON, BRIT. FUNGI; COOKE, ILLUSTR. PL. 22.

Pileus fleshy, at first globose then convex and explanate or slightly depressed; the flesh very thick, soft, white changing immediately to saffron-red when cut or broken; the dermis fibrillose-tomentose beneath the cuticle; cuticle thick, smooth, bay-brown, at first continuous, soon cracking and becoming reticulate, then separating into large irregular scales, which are drawn apart and persist upon the surface. Stipe tapering upward from a bulbous base, thick, stout, fistulous, fibrous-stuffed, smooth and glabrous, whitish; the annulus thick, mobile, fibrous-lacerate. Lamellae broad, close, whitish or pinkish, tapering inward and remote from the apex of the stipe; spores elliptic-ovoid, 10-12 x 6-8 mic.

Solitary or subcaespitose; growing in rich soil in fields and woods. Reported from various parts of the country from New England to the Pacific coast; but it is certainly rare. Pileus 10-15 cm. in diameter; the stipe 12-20 cm. long and 1-2 cm. thick above the very thick bulbous base.

77. LEPIOTA MORGANI, AGARICUS MORGANI PECK, BOTANICAL GAZETTE, 1879.

Pileus fleshy, at first globose then convex and expanded; the flesh thick, firm, white, deeply impressed around the apex of the stipe; the dermis white beneath the cuticle, radiately fibrillose; the cuticle at first continuous, buff to pale umber, soon broken up, except in the center, into irregular scales and patches, which are gradually drawn apart and at length are more or less deciduous. Stipe hard and firm, tapering upward from a thickened base, with a narrow tubule, fibrous-stuffed, the surface glabrous, buff to pale umber; annulus thick, soft, subcoriaceous, mobile, raised high upon the stipe. Lamellae rather broad, ventricose, close, remote from the stipe, at first white then changing to a greenish hue, at length dull green; spores in mass at first bright green, fading to dull green; with age becoming sordid, subelliptic, obliquely apiculate, 9-11 x 6-8 mic., with a large guttule.

Gregarious; growing in meadows, pastures and open woods; sometimes seen grouped in large rings. Met with throughout the Mississippi Valley from Michigan to the Gulf States and from Pennsylvania westward to Kansas and Nebraska. Pileus 10-20 cm. in diameter, the stipe 15-20 cm. in height, 1-2 cm. thick at the apex and 2-4 cm. thick at the base.

b. Lepiotae of small size; the annulus thin membranaceous, and not easily movable.

78. LEPIOTA AMERICANA PECK, 49 N. Y. REP. 1895; AGARICUS AMERICANUS PECK, 23 N. Y. REP, 1870.

Pileus fleshy, ovoid then campanulate and expanded, umbonate; the flesh thin, white, reddening when cut or broken; the dermis radiately fibrillose beneath the cuticle and at first white; the cuticle brick-color or bay-brown, at first continuous, soon breaking up except upon the umbo into small scales, which are gradually drawn apart and scattered over the surface. Stipe tapering upward from a base more or less thickened and elongated, fistulous, smooth and glabrous, white, reddening when handled; the annulus thin, membranaceous. Lamellae rather narrow, close, free, white; the spores subelliptic, 8-10 x 5-7 mic. uniguttulate.

Solitary or subcaespitose; growing in rich soil in grassy grounds or around old stumps, Eastern U. S. west to Michigan and Ohio, south to Alabama. Pileus 5-10 cm. in diameter; the stipe 8-12 cm. in length, 4-6 mm. thick at the apex, 8-12 mm. thick at the swollen base. When young and growing the whole plant except the epidermis of the pileus is white, but when handled or in drying it assumes a dull reddish or smoky-red color. It is quite probable that Agaricus Badhami B. & Br. catalogued by Sprague, Proc. Soc. N. H., Boston, 1859, was based upon specimens of this plant.

79. LEPIOTA CALOCEPS ATKINSON, JOURNAL MYCOLOGY, 1902.

Pileus fleshy, ovoid then convex and expanded; the flesh thick, firm, white; the dermis with a brownish or tawny-olivaceous cuticle, at first continuous, at length cracking and separating into rectangular or nearly square areas. Stipe arising from a bulbous base, fistulous, white above, dull flesh-color below, covered up to the annulus by angular patches of the dermis similar to those on the pileus. Lamellae rather narrow, close, free, dingy white; spores elliptic-oblong, obliquely apiculate, 6-8 x 2.5-3.0 mic.

Gregarious; growing on the ground in woods. New York, *Atkinson.* Pileus 4-8 cm. in diameter, the stipe 6-10 cm. in height and 6-10 mm. thick. It is possible this species belongs more properly in the Clypeolariae.

80. LEPIOTA EXCORIATA, AGARICUS EXCORIATUS SCHAEFFER, INDEX, 1774; ICONES TAB. 18 ET 19; COOKE, ILLUSTR. PL. 23; BRESADOLA, FUNG. MANG. TAV. 14.

Pileus fleshy, ovoid then convex and expanded, subumbonate; the flesh thick, soft, white, impressd around the apex of the stipe; the dermis white-fibrillose beneath the cuticle; the cuticle thin, firm, whitish or sometimes dusky in the center, splitting and peeling up around the margin or breaking away in scales, sometimes altogether persistent. Stipe arising from a slightly thickened or bulbous base, fistulous, fibrous-stuffed, white, smooth and glabrous; the annulus firm, membranaceous. Lamellae broad, close, white, tapering inward and remote from the stipe; spores elliptic-oblong, 14-16 x 9-11 mic.

Growing in pastures and fields. New England, *Frost;* N. Carolina, *Curtis;* Alabama, *Atkinson;* Pacific Coast Cat. Pileus 5-7 cm. in diameter, the stipe 6-8 cm. long and 6-10 mm. thick. Withering and Persoon considered this species to be a small form of Lepiota procera; the size of the spores lends countenance to this opinion.

81. LEPIOTA NAUCINOIDES, AGARICUS NAUCINOIDES PECK, 29 N. Y. REP. 1876; AGARICUS NAUCINUS PECK, 23 N. Y. REF. 1870; MORGAN, MYC. FLORA M. V.

Pileus fleshy, subovoid and obtuse, then convex, expanded and explanate, subumbonate; the flesh thick, white; the dermis a thin membrane, white or smoky white, its surface commonly smooth and glabrous, but sometimes the cuticle breaks up into very minute fibrillose scales. Stipe tapering upward from a clavate base, fistulous, fibrous-stuffed, white, smooth and glabrous or becoming slightly fibrillose toward the base; the annulus thin, membranaceous, white, persistent. Lamellae broad, close, free, white, after maturity slowly changing in color to a dull livid; spores elliptic-ovoid, 8-9 x 5-6 mic. uniguttulate.

Gregarious; growing in grassy grounds, pastures, roadsides, etc. Eastern U. S. westward to Kansas. Pileus 4-8 cm. in diameter; the stipe 8-12 cm. in height, 6-12 mm. thick at the apex, 1-2 cm. thick at the base. European writers evidently confuse two species. Agaricus naucinus of Fries, and Berkeley, is A. sphaerosporus Krombliz. Lepiota naucina Bresadola, Fung. Mang. is A. naucinoides Peck. Agaricus naucinus with spherical spores occurs also in Australia; See Cooke's Handbook of Australian Fungi.

82. LEPIOTA SOLIDIPES PECK, 52 N. Y. REP. 1898.

Pileus fleshy, subhemispheric then convex and nearly plane; the flesh thick white; the dermis a continuous membrane, the surface smooth and glabrous, white sometimes with a slight pinkish tint. Stipe nearly equal or somewhat bulbous, solid, whitish, silky-fibrillose; the annulus thin, subevanescent. Lamellae close, free, white; spores subglobose, 4-5 mic. in diameter.

Growing in damp or swampy ground. New York, *Peck.* Pileus 5-10 cm. in diameter, the stipe 5-10 cm. long and 8-12 mm. thick. This species is distinguished from Lepiota naucina by its solid stipe and perhaps also by its smaller spores.

83. LEPIOTA AVELLANEA CLEMENTS, BOT. NEB. II, 1893.

Pileus fleshy, dry, explanate; the cuticle brown, at length lacerate toward the margin into appressed scales. Stipe arising from a bulbous base, fistulous, brown-fibrillose; the annulus thin, brownish, persistent. Lamellae cream-color, reddening with age, remote from the stipe; spores irregularly ovoid, acute at one apex, 8-10 x 5-6 mic.

Growing on the ground in a green house. Nebraska, *Clements*. Pileus 5 cm. in diameter, the stipe 4 cm. long and 8 mm. thick.

§ 3. *ANNULI SUPERI. THE VEIL IN THIS SECTION IS A PROLONGATION BEYOND THE APEX OF THE DERMIS OF THE STIPE; THIS IS REFLEXED OUTWARD AND DOWNWARD OVER THE LAMELLAE, THE LOWER SURFACE OF THE VEIL CORRESPONDING TO THE OUTER SURFACE OF THE STIPE. IT IS AT FIRST IN CONNECTION WITH THE EDGES OF THE LAMELLAE, FORMING A CONTINUOUS MEMBRANE OVER THE WHOLE HYMENIUM; AS THE PILEUS EXPANDS THIS CONNECTION IS DISSOLVED, BEGINNING WITH THE MARGIN OF THE PILEUS, UNTIL AT LENGTH THE ENTIRE MEMBRANE IS ATTACHED ONLY TO THE UPPER END OF THE STIPE, HANGING DOWN FROM IT AND FLARING OUTWARDS.*

X. LYCOPERDINEAE. *Pileus thick and fleshy; the dermis from the first composed of thick scales and pyramidal warts. Stipe thick, stout and usually solid, often prolonged downward and deeply rooting; the veil persistent entire or more or less torn and fragmentary.*

A tribe of several species named for Lepiota lycoperdinae Spegazzini, Fungi. Arg. The European representative is Lepiota Vittadini Moretti, Bot. Ital., "A large species, of a pure white; extremely beautiful" (Berkeley.)

84. LEPIOTA POLYPYRAMIS, A. (AMANITA) POLYPYRAMIS B. &. C., ANN. & MAG. N. H. 1853.

Pileus fleshy, subglobose then convex and expanded; the flesh thick, soft, white; the dermis composed of thick pyramidal warts, which, by the growth of the pileus, are gradually separated, except in the center, drawn apart and to some extent deciduous. Stipe thick at the base and tapering downward into a very long rooting portion, tapering slightly upward, solid, the surface white and somewhat scaly; the veil a large, thick, warted membrane, torn in pieces by the expansion of the pileus and at length falling away. Lamellae close, white, tapering inward and reaching the stipe; spores elliptic, 8-10 x 6-8 mic.

Growing in rich soil among old leaves in woods. S. Carolina, *Curtis;* Preston, O. Pileus 10-15 cm. in diameter; the stipe 15-25 cm. in length including the root, 3-5 cm. thick at the base. This species is one of the forms of Amanita solitaria, so thoroughly discussed and so elegantly illustrated by Atkinson in "Mushrooms edible, poisonous, etc."

85. LEPIOTA RADICATA, AMANITA RADICATA PECK, BULL. TORR. CLUB, 1900.

Pileus fleshy, subglobose, convex then expanded; the flesh thin, white; the dermis composed of large thick persistent scales and warts, all white or becoming dusky; the veil lacerate, the fragments to some extent appendiculate, at length more or less deciduous. Stipe tapering upward from a thick base and downward into a long root, solid, white, fibrillose above, floccose-scaly below. Lamellae broad, close, white, adnexed; spores oblong, 9-11 x 5-6 mic.

Solitary; growing in grassy ground in thin woods. New Jersey, *Sterling;* Preston, O. Pileus 5-10 cm. in diameter; the stipe 6-8 cm. long above the rooting portion which is 4-6 cm. in the ground; the base of the stipe 12-20 mm. thick, the apex 6-8 mm. thick. This too is only another form of the Amanita solitaria of Atkinson's "Mushrooms."

86. LEPIOTA DAUCIPES, A. (AMANITA) DAUCIPES B. & M.; SYLL. CRYPT. 1856.

Pileus fleshy, globose then convex and expanded; the flesh thick, compact, white; the dermis composed of crowded, pyramidate warts, polygonal at the base and saffron-yellow at the apex; the veil fibrillose-floccose, yellowish, stretched between the margin of the pileus and the apex of the stipe, at length torn in pieces and disappearing. Stipe solid, with a thick base, narrowed upward to the apex and tapering downward into a long root, clothed below with broad, imbricate scales. Lamellae rather narrow, tapering to both ends, white, reaching the stipe; spores globose (?).

Growing in cultivated fields. Columbus, O., *Sullivant.* Pileus 6 cm. in diameter; the stipe 12-15 cm. long including the rooting portion, about 5 mm. thick at the narrow apex, but 3-4 cm. at the thickened base. The polygonal warts of the pileus are like those of Lepiota Vittadini, but are colored at the apex.

87. LEPIOTA PELIDNA, A. (LEPIOTA) PELIDNUS B. & M.; SYLL. CRYPT. 1856.

Pileus fleshy, ovoid then convex and expanded; the flesh thick, white, rufescent; the dermis thick, furfuraceous-rugose, greenish-livid in color; the veil continuous with the dermis and of similar substance, at maturity lacerate, the fragments dependent from the margin of the pileus. Stipe arising from a thick bulbous base, solid, elongated, furfuraceous-scaly and colored as the pileus. Lamellae narrow, white or pinkish, rufous when dried, remote from the dilated apex of the stipe and there attached by a very short tooth; spores globose and oblong, 10 mic. in length.

Growing on fallen trunks, Columbus, O., *Sullivant.* Pileus 7-9 cm. in diameter; the stipe 11-15 cm. long, in the middle 1.5-2 cm. thick, the bulbous base 3-4 cm. in diameter. The species is remarkably distinguished by the greenish-livid color of the pileus and stipe, the color of Russula virescens.

88. LEPIOTA DRYMONIA MORGAN SP. NOV. ILLUSTRATION IN HERBARIUM.

Pileus fleshy, subglobose then convex and expanded; the flesh thick, white; the dermis thick, drab to pale umber, soon breaking up into reflexed, squarrose scales, which are gradually drawn apart and scattered over the white surface. Stipe stout, solid, tapering upward from a thick base, squarrose with reflexed scales, colored as on the pileus; the veil thin, white membranaceous, lacerate, the outer fragments appendiculate. Lamellae broad, close, white, free; spores ——.

Growing on the ground among old leaves in woods. Pomfret, Vt., *Morgan.* Pileus 8-10 cm. in diameter; the stipe 10-14 cm. long, 12-16 mm. thick at the apex, 3-4 cm. thick at the base. This is certainly an elegant species of the type of Lepiota Vittadini, but unfortunately I failed to bring away my specimens and get the spore measurements.

XI. LENTICULARES. *Dermis of the pileus growing uniformly with the expansion of the latter and maintaining a smooth, unbroken surface, but coated with a thin, viscid epidermal layer. Stipe solid or stuffed; the veil large membranaceous.*

A tribe consisting of a few species of large Agarics, most of them formerly referred to Amanita. Karsten and Gillet transfer the species of Frie's fourth tribe to Lepiota. Costantin and Dufour describe Lepiota Persoonii Fr., L. lenticularis Lasch and L. arida Fr. all with "chapeau visqueux."

89. LEPIOTA GUTTATA, Agaricus guttatus Persoon, Synopsis, 1801; Agaricus lenticularis Lasch in Linnaea 1828.

Pileus fleshy, at first globose then convex and expanded; the flesh thick, soft, white; the dermis a thin, firm, smooth membrane, pale alutaceous to pinkish, with a viscid cuticle. Stipe elongated, at the base slightly bulbous, or wholly equal, spongy-stuffed, minutely scaly or subglabrous, white; annulus a large smooth membrane, rather distant from the pileus. Lamellae rather narrow, crowded, whitish, tapering inward but free; spores ——.

Growing in humid places in woods. N. Carolina, *Curtis.* Pileus 7-10 cm. in diameter, the stipe 10-15 cm. long and about 2 cm. thick.

90. LEPIOTA BENTISTA Morgan sp. nov.

Pileus fleshy, globose then convex and explanate; the flesh thin, white; the dermis a thin, smooth membrane whitish or pale alutaceous; with a viscid cuticle. Stipe arising from a slightly bulbous base, subequal, stuffed, white, smooth but viscid; the annulus thin, white, membranaceous. Lamellae narrow, close, white, free; spores elliptic-ovoid, 9-11 x 5-6 mic.

Growing on the ground. Blue Mounds, Wis., *Denniston.* Pileus 5-8 cm. in diameter, the stipe 6-8 cm. long and 8-12 mm. thick.

THE DESCRIPTIVE SYNOPSES.

LEPIOTA *Persoon, Synopsis 1801; Fries, Syst. Myc. 1821. Hym. Eur. 1874; Saccardo, Sylloge Fungorum, V, IX, XI, XIV, XVI, XVII.*

Pileus soft fleshy, rather dry; veil marginal. Stipe hollow or fibrous-stuffed, rarely solid, commonly tapering upward from a thickened base; volva none. Lamellae free, approximate or remote, rarely reaching the stipe; spores white, sometimes with a tinge of pink or yellow, in one species bright green.

§ 1. *ANNULI INFERI. THE VEIL IN THIS SECTION HAS A TWO-FOLD ORIGIN; IT IS A CONTINUATION OF THE OUTERMOST ROW OF CELLS OF THE STIPE WHICH HAS GROWN FOR SOME TIME WITH THE STIPE BY INTERCALARY GROWTH AND PASSES INTO THE MARGIN OF THE PILEUS; AND CONVERSELY IT IS A CONTINUATION OF THE OUTERMOST HYPHAE OF THE PILEUS PASSING INTO THE SURFACE OF THE STIPE. THE SEPARATION TAKES PLACE AT THE MARGIN OF THE PILEUS, THE VEIL*

REMAINS ATTACHED TO THE STIPE AS A RING OR AS A SHEATH RUNNING DOWN ITS SURFACE OR SOMETIMES PORTIONS OF IT FORM A FRINGE OR APPENDAGE TO THE MARGIN OF THE PILEUS.

I. MESOMORPHAE. *Dermis of the pileus entire, the surface of both pileus and stipe smooth and glabrous; the veil annulate, often evanescent.* . . . . Species: 1-2

II. EUCONIATI. *Dermis of the pileus not lacerate, but the surface pruinose, finely pulverulent or minutely furfuraceous; the investment of the stipe usually simliar to that of the pileus; the veil often appendiculate.*

A. STIPE GLABROUS. . . . . Species: 3

B. STIPE PULVERULENT OR MINUTELY FURFURACEOUS. . . . . Species: 4-12

III. GRANULOSAE. *Dermis of the pileus or at least its outer layer composed of granules, minute warts or furfuraceous particles; the investment of the stipe similar to that of the pileus; the veil of like structure, lacerate and appendiculate.*

a. Lamellae adnate to the stipe. . . . Species: 13-16

b. Lamellae free from the stipe or merely reaching it. . . . . Species: 17-20

IV. CLYPEOLARIAE. *Dermis of the pileus a thin membrane, radiately fibrillose, the cuticle at first continuous but sooner or later broken up and drawn apart by the growth of the pileus, this at length presenting a white-fibrillose surface sprinkled with colored scales; the veil lacerate, part of it appendiculate, continuous downward with the floccose-fibrillose investment of the stipe.* . . . . Species: 21-28

V. ASPERAE. *Dermis of the pileus or at least its superficial layer fibrillose-scaly from the first, the scales reflexed and squarrose or the fibres fasciculate and convergent into pointed warts; the veil and the cuticle of the stipe may be of similar texture or the stipe may be nearly glabrous.* . Species: 29-35

VI. GLIODORMATAE. *Dermis of the pileus continuous, never separating into scales, but the surface invested by a more or less thickened layer of gluten, pellucid or colored. Stipe commonly dry and squamulose or subglabrous, in a few species with a viscid cuticle like the pileus.* . . . . Species: 36-41

§ 2. *ANNULI MOBILES. THE VEIL IN THIS SECTION IS MARGINAL AND INFERIOR AS IN THE FIRST SECTION, BUT THE DERMIS OF THE PILEUS AND THAT OF THE STIPE ARE DISSIMILAR, THE COL-*

ORED CUTICLE OF THE PILEUS NOT BEING CONTINUED DOWNWARD UPON THE STIPE, RARELY COLORING EVEN THE UPPER MARGIN OF THE VEIL. THE VEIL IS ANNULATE UPON THE STIPE AND IS COMMONLY A THIN MEMBRANACEOUS BAND, THOUGH SOMETIMES IT IS THICKENED AND SUBCORIACEOUS; IT IS CONTINUOUS DOWNWARD WITH THE DERMIS OF THE STIPE, AND BY ITS UPPER BORDER CONNECTS WITH THE DERMIS OF THE PILEUS. SOMETIMES THE VEIL IS FIRST TORN AWAY FROM THE STIPE AND DRAWN UPWARD TO SOME EXTENT UNTIL THE EXPANSION OF THE PILEUS BEGINS, THUS GIVING RISE TO THE TYPICAL "ANNULUS MOBILIS."

VII. SUBCLYPEOLARIAE. *Dermis of the pileus a thin membrane, radiately fibrillose; the cuticle at first continuous, at length separating into small or minute scales, which are drawn apart and scattered over the white fibrillose surface. The cuticle of the stipe commonly white, smooth and even or only appressedly fibrillose; the annulus thin and membranaceous, usually persistent.*

a. *Scales of the pileus white, cineleous, yellowish.* . . . . Species: 42-45
b. *Scales of the pileus red, rufous, fulvous.* . . . . Species: 46-52
c. *Scales of the pileus brown or blackish.* . Species: 53-59

VIII. HIATULOIDES. *Pileus submembranaceous, thin, soft and flexible, umbonate; the flesh well nigh obsolete except beneath the central disc; the dermis radiately fibrillose and plicate-sulcate often to the umbo; the cuticle separating into scales. Stipe slender and sometimes much elongated, fistulous and fragile, subglabrous; the annulus thin and membranaceous.*

a. *Pileus white with pallid or brownish scales.* . . . . Species: 60-66
b. *Pileus white with yellow or all yellow.* . Species 67-72

IX. PROCERAE. *Pileus thick and fleshy, usually umbonate; the dermis floccose or fibrillose beneath the cuticle; the cuticle at first smooth and continuous, at length commonly separating into large irregular scales which are more or less deciduous. Stipe tapering upward from a thickened or bulbous base; the annulus often thick subcoriaceous, and truly movable.*

a. *Lepiotae of the largest size; the annulus thick and easily movable.* . . . . Species: 73-77
b. *Lepiotae of small size; the annulus thin membranaceous, and not easily mov*able. . . . Species: 78-83

§ 3. *ANNULI SUPERI. THE VEIL IN THIS SECTION IS A PROLONGATION BEYOND THE APEX OF THE DERMIS OF THE STIPE; THIS IS REFLEXED OUTWARD AND DOWNWARD OVER THE LAMELLAE, THE LOWER SURFACE OF THE VEIL CORRESPONDING TO THE OUTER SURFACE OF THE STIPE. IT IS AT FIRST IN CONNECTION WITH THE EDGES OF THE LAMELLAE, FORMING A CONTINUOUS MEMBRANE OVER THE WHOLE HYMENIUM; AS THE PILEUS EXPANDS THIS CONNECTION IS DISSOLVED, BEGINNING WITH THE MARGIN OF THE PILEUS, UNTIL AT LENGTH THE ENTIRE MEMBRANE IS ATTACHED ONLY TO THE UPPER END OF THE STIPE, HANGING DOWN FROM IT AND FLARING OUTWARD.*

X. LYCOPERDINEAE. *Pileus thick and fleshy; the dermis from the first composed of thick scales and pyramidal warts. Stipe thick, stout and usually solid, often prolonged downward and deeply rooting; the veil persistent entire or more or less torn and fragmentary.* . . . . . . Species: 84-88

XI. LENTICULARES. *Dermis of the pileus growing uniformly with the expansion of the latter and maintaining a smooth, unbroken surface, but coated with a thin, viscid epidermal layer. Stipe solid or stuffed; the veil large membranaceous.* . . . . Species: 89-90

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THE RUSTS OF GUATEMALA.[*]

FRANK D. KERN.

Two botanical excursions have been made to Guatemala, Central America, by Professor W. A. Kellerman; one during the months of Jauuary, February and March, 1905, and another during the corresponding season of 1906. The principal object of the trips was to secure collections of parasitic fungi, but a large amount of material which will serve to illustrate the general botanical character of the country was brought back. The trips covered the territory from the Atlantic to the Pacific coast, special attention being given to collecting in the higher altiudes of the intervening mountainous and volcanic regions.

Professor Kellerman has very generously sent much of his material to a number of workers for identification and study, the collections of rusts with some notes having been placed in the hands of the writer. The present communication is a report of the studies upon the larger portion of the material. There still remain a number of specimens, some of which may be undescribed, but concerning which no definite conclusions have yet been reached. In all determinations and in the drawing up of descriptions of new species the writer has been aided by Prof. J. C. Arthur and enjoyed the privilege of access to his herbarium and library.

In many instances new hosts have been added and the geographical distribution has often been extended. It has been found necessary to describe several species as new. Perhaps the most notable single collection is the Aecidium on Byrsonima crassifolia. The species are distributed among all the larger groups of the Uredinales.

1. COLEOSPORIUM IPOMOEAE (Schw.) Burr.—On *Ipomoea macrocalyx* (Ruiz. & Pav.) Choisy (host no. 5187), Laguna, Depart. Amatitlan, alt. 1200 m., Jan 20, 1906, no. 5408

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[*] Contributions to Guatemalan Mycology IV. (The three previous articles in this series were by W. A. Kellerman.)